May 3, 1932. F. MAXANT 1,857,028

SHEET FEEDING MECHANISM FOR PLAITING MACHINES

Filed Feb. 12, 1927 4 Sheets-Sheet 1

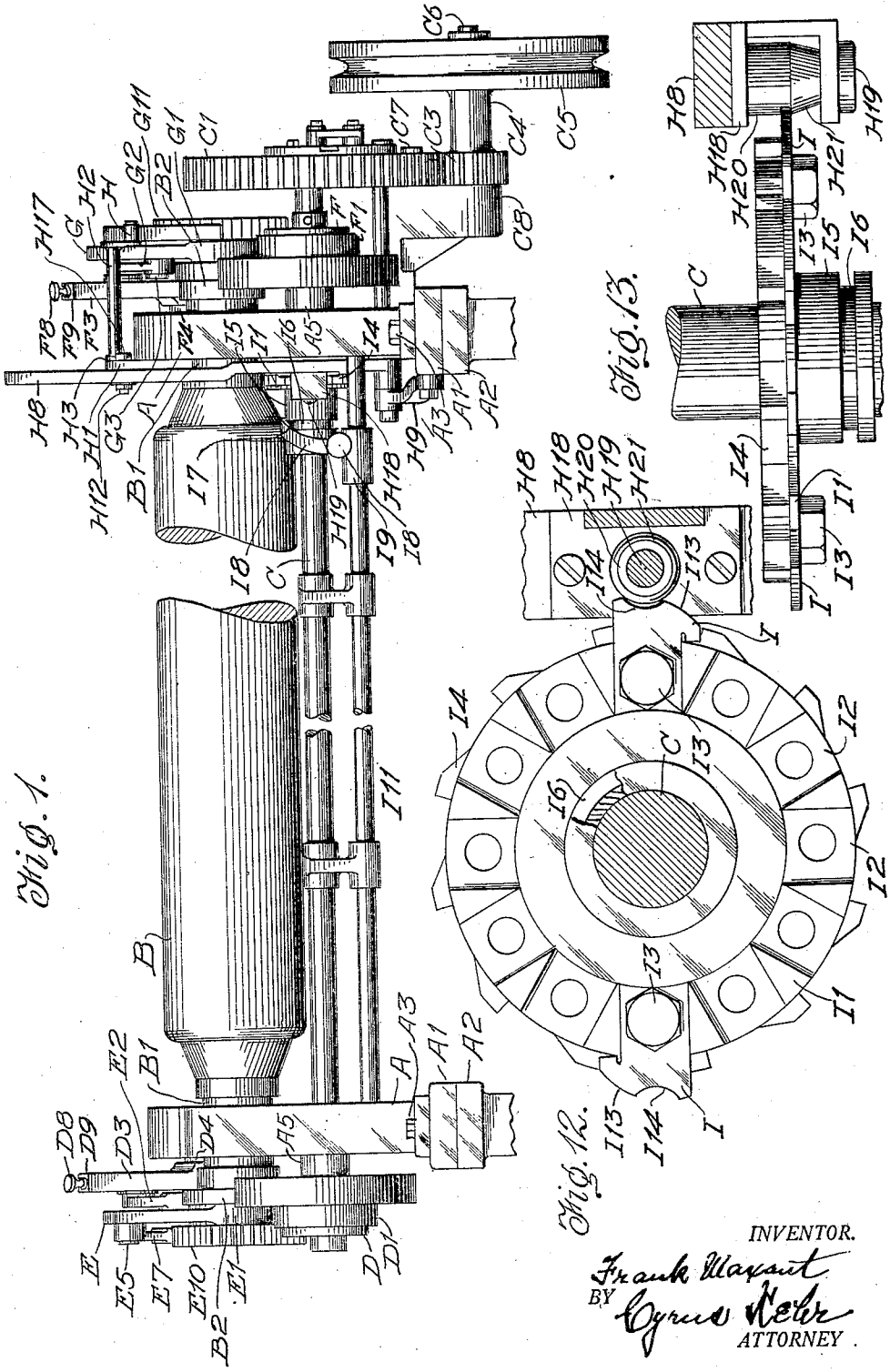

Fig. 1.

Fig. 1a.

Fig. 1b.

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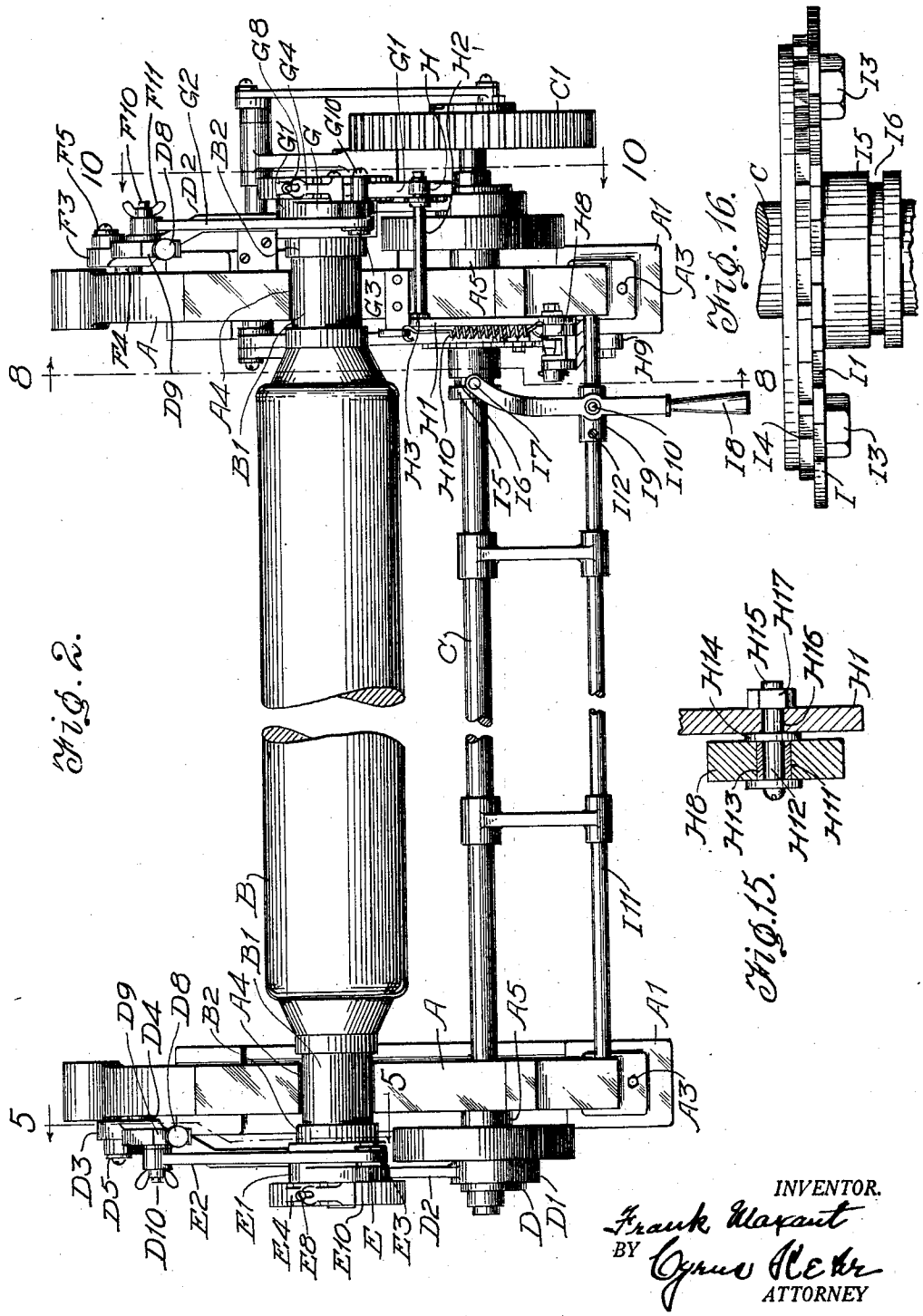

Fig. 2.

Fig. 16.

Fig. 15.

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SHEET FEEDING MECHANISM FOR PLAITING MACHINES

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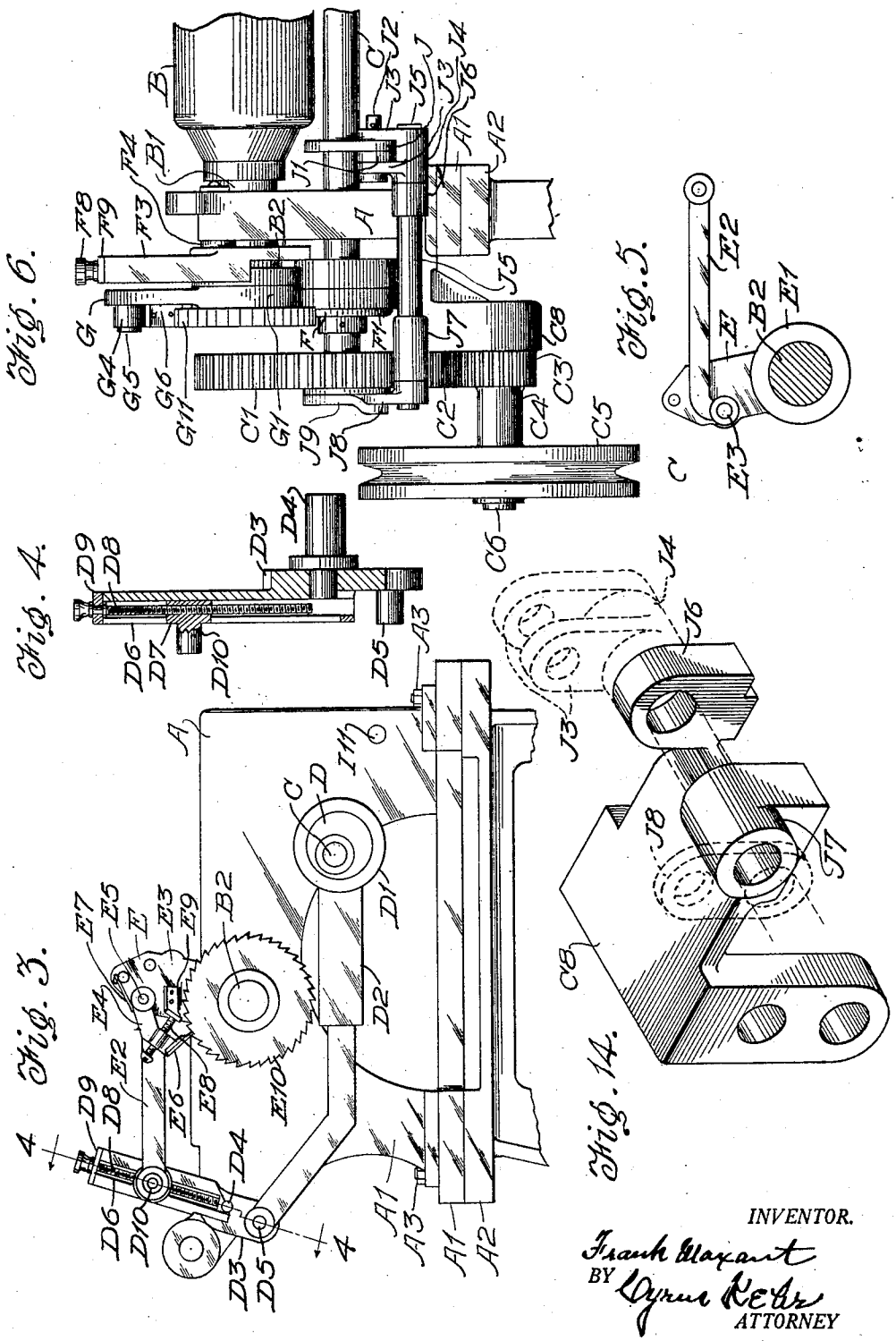

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May 3, 1932. F. MAXANT 1,857,028

SHEET FEEDING MECHANISM FOR PLAITING MACHINES

Filed Feb. 12, 1927 4 Sheets-Sheet 4

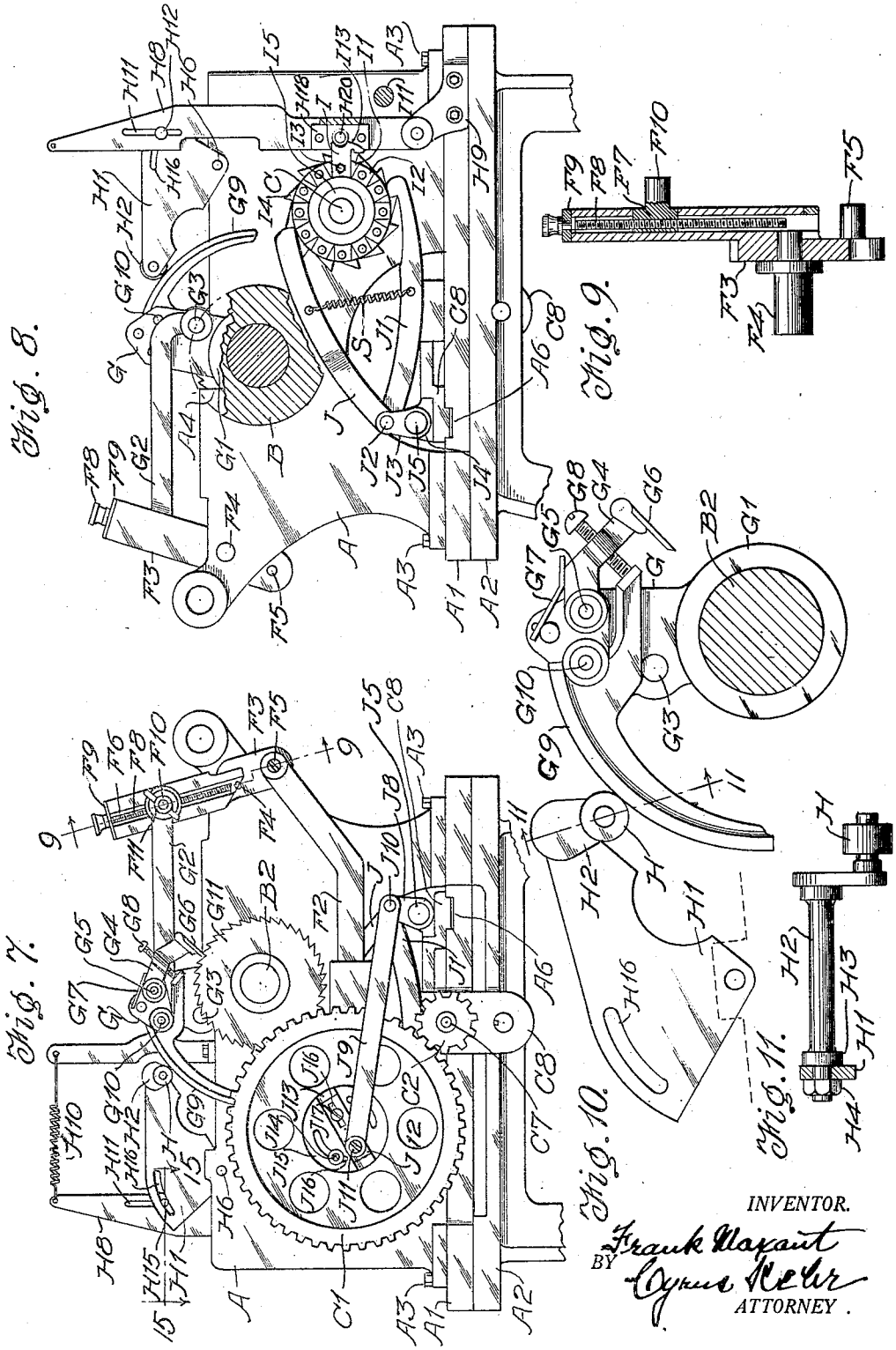

Fig. 8.

Fig. 9.

Fig. 7.

Fig. 10.

Fig. 11.

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Patented May 3, 1932 1,857,028

UNITED STATES PATENT OFFICE

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SHEET FEEDING MECHANISM FOR PLAITING MACHINES

Application filed February 12, 1927. Serial No. 167,796.

This invention relates to means for turning the feed roll of machines for plaiting cloth, paper and similar sheet-form material, such machines being already well known in this art.

Such machines are provided with mechanism for automatically imparting to such rolls partial turns whereby the sheet is moved forward far enough to provide material for making a fold, the folds being made by means of plates or bars actuated automatically, as already well known.

The object of this invention is to combine with such a feed roll means for at intervals varying the distance through which the roll turns, whereby the sheet is advanced through varying distances, whereby the folds may be formed in groups separated by parts of the sheet which are not folded, the result being an attractive stripe appearance and economy in the use of material.

Broadly speaking, my improved mechanism consists of two sets of ratchet mechanisms, the first operating regularly or uninterruptedly to turn the roll through a range equal to the throw of the pawl, and the other or second ratchet mechanism at chosen intervals acting simultaneously with the first ratchet mechanism but giving the roll a farther turn by giving the pawl a farther throw.

In the form shown in the drawings, the first ratchet mechanism is arranged or in gear for constant action, while the second ratchet mechanism is provided with means, controlled by the operator, for putting that mechanism into and out of gear. When that mechanism is thrown out of gear the first ratchet mechanism operates by itself to give the feed roll uniform movements.

The second ratchet mechanism is provided with means for making adjustment for varying the length of the throw of the pawl and for varying the time interval between the actions of that pawl.

The first ratchet mechanism is shown at one end of the machine and the second ratchet mechanism is at the other end of the machine.

In the accompanying drawings,

Fig. 1 is a front elevation of a machine embodying my invention, parts being omitted;

Fig. 2 is a plan of the same machine;

Fig. 3 is an elevation of the left hand end of the machine;

Fig. 4 is an upright section on the line, 4—4, of Fig. 3, looking to the left;

Fig. 5 is a section on the line, 5—5, of Fig. 2, looking in the direction of the arrow;

Fig. 6 is a rear elevation of the right hand part of the machine;

Fig. 7 is an elevation of the right hand end of the machine;

Fig. 8 is an upright section on the line, 8—8, of Fig. 2, looking toward the right;

Fig. 9 is a section on the line, 9—9, of Fig. 7, looking in the direction of the arrow;

Fig. 10 is a detail section on the line, 10—10, of Fig. 2, looking toward the left, parts being omitted;

Fig. 11 is a detail section on the line, 11—11, of Fig. 10;

Fig. 12 is an enlarged view of a combined ratchet and cam wheel shown in Fig. 8;

Fig. 13 is a horizontal section on the line, 13—13, of Fig. 12;

Fig. 14 is a perspective of a casting comprising bearings for several operating members;

Fig. 15 is a horizontal section on the line, 15—15, of Fig. 7;

Fig. 16 shows another form of the ratchet and cam wheel.

Referring to the drawings, A, A are upright metal end plates which support the principal working parts of the machine. Each end plate is supported on a horizontal base plate, A1. Each base plate, A1, is supported on a leg stand, A2. At each end of the machine, upright bolts, A3, bind the end plate and the base plate and the leg stand to each other.

B is the roll for feeding the sheet. In the trade this is termed the "lower roll". At each end, said roll has a journal, B1, resting in a bearing, A4, formed in the adjacent end plate.

Transmission of power to the two ratchet mechanisms is effected through the main transmission shaft, C, which is parallel to

the roll, B, and rests in bearings, A5, formed in the end plates, A. Said shaft extends through both of said bearings.

On the right hand end of said shaft, as viewed in Fig. 1, is fixed a spur gear wheel, C1, which meshes with the intermediate spur gear wheel, C2, which meshes with the spur gear wheel, C3. The wheel, C2, is rotatable on a fixed horizontal stub axle, C7, which is supported on the bracket, C8. The gear wheel, C3, is integral with a hub, C4, and a pulley, C5. Said gear wheel, hub and pulley rotatably surround a fixed horizontal stub axle, C6, which is supported on the bracket, C8. A belt (not shown) applied to the pulley, drives the pulley, whereby motion is transmitted through the gear wheels, C3, C2 and C1, to the shaft, C, the motion of the wheel, C1, of the shaft, C, being clockwise as viewed from the right hand end of the machine.

The first ratchet mechanism, that which is at the left-hand end of the machine, will now be described.

On the left hand end of the main transmission shaft, C, is fixed an eccentric, D, to which is applied an eccentric strap, D1. To that strap is applied a horizontal arm, D2, the rear end of which is coupled to the lower end of a rocking arm, D3, which is pivoted on a horizontal stub shaft, D4, fixed on the outer or left hand face of the adjacent end plate, A. A block, D7, slidable in the slot, D6, extends lengthwise in the rocking arm and a pintle, D5, joins the arm, D2, and the rocking arm, D3. A screw, D8, is threaded through said block and is held in a bearing, D9, formed in the upper end of the rocking arm. On the block, D7, is a horizontal stud or wrist, D10.

An oscillating member, E, is held loosely on the adjacent neck, B2, of the roll, B, by means of a strap, E1, surrounding said neck. A link, E2, has its rear end coupled to the stud, D10, on the block, D7, of the rocking arm, D3. The forward end of said link is coupled to the member, E, by means of a horizontal stud, E3, on the right hand side of the member, E. A pawl, E4, is mounted on a horizontal stud, E5, rigid on the left hand side of the member, E, and is directed rearward. A blade, E6, is fixed on the free end of the pawl and is adapted to engage the ratchet wheel, E10, which is fixed on the adjacent neck of the roll, B. A blade spring, E7, is supported on the member, E, and bears downward on the pawl to yieldingly press the pawl toward the ratchet wheel. A set screw, E8, is threaded on the pawl in position to bear downward against a bracket, E9, seated on the member, E. By adjusting this screw on the pawl, the limit of movement of the pawl blade toward the ratchet wheel is varied.

The transmission from the pulley, C5, to the main shaft, C, is continuous. Consequently the eccentric, D, is rotated continually and uniformly. Thus the arm, D2, is reciprocated continually for actuating the rocking arm, D3, and the link, E2, the oscillating member, E, and the pawl, E4. The range of oscillation of the member, E, and consequently the forward throw of the pawl, E4, are varied by varying the position of the block, D7, by means of the screw, D8, this adjustment being made manually by the operator. It is to be kept in mind that, after such adjustment has been made and the pawl is allowed to remain in the working position, the movements of the pawl are through equal distances and at each movement the pawl turns the ratchet wheel, E10, and the roll, B, through the same number of degrees.

The ratchet mechanism at the right hand of the machine, the second ratchet mechanism, will now be described.

This mechanism is in part a duplication of the left hand or first ratchet mechanism above described.

On the main shaft, C, is fixed an eccentric, F, to which is applied an eccentric strap, F1, to which is applied a rearward-directed horizontal arm, F2. At the rear of said arm is an upright rocking arm, F3, which is pivoted on a stub shaft, F4, extending rotatably from the adjacent end plate, A. A pintle, F5, serves to couple the rear end of the arm, F2, to the rocking arm, F3. In the upper part of the rocking arm is a slot, F6, parallel to the length of said arm. In said slot is a slidable block, F7. A screw, F8, is placed parallel to said slot and threaded through said block and has its upper end seated in a bearing, F9. By turning said screw, said block may be moved along said slot.

An oscillating member, G, has a strap, G1, loosely surrounding the neck, B2, of the roll, B, the member, G, extending upward from said neck. A link, G2, joins the oscillating member, G, and the block, F7, the forward end of said link being coupled to the member, G, by means of a stud, G3, on the member, G, while the rear end of said link is coupled to the block, F7, by means of a stud, F10, on the block, F7. A nut, F11, is applied to the outer end of said stud to retain said link on the stud.

A pawl, G4, has its forward end, G1, on a stud, G5, on the right hand face of the oscillating member, G. On the other or free end of the pawl is a blade, G6, which is adapted to engage the teeth of the ratchet wheel, G11. A blade spring, G7, has its forward end secured to the member, G, and has its rear or free end bearing downward on the upper face of the pawl, G4, for yieldingly pressing the pawl downward. An adjusting screw, G8, extends downward through the body of the pawl. A cam lever, G9, is

journaled on a stud, G10, seated on the right hand face of the member, G, forward of the stud, G5. Said arm reaches rearward into the path of the adjusting screw, G8. Said screw limits the tilting of the lever, G9, for lowering the forward end of said lever. Said forward end is so long as to give it weight tending to tilt said lever and cause it to bear against the screw, G8, with sufficient force to lift the pawl out of engagement with the ratchet wheel, G11. But the pressure exerted by the spring, G7, is to be sufficient to normally overcome this action of the lever, G9, so that normally the pawl will act on the ratchet wheel during the rotation of the main shaft, C, and the consequent action of the arms, F2 and F3, and the link, G2. Another group of mechanism is associated with the cam lever, G9, for periodically depressing said lever to overcome the action of the spring, G7, and cause the lifting of the pawl, G4, out of engagement with the ratchet wheel, G11. That controlling mechanism will now be described.

An upright triangular rocking plate, H1, is placed forward of the cam lever, G9, and pivoted to the left hand face of the adjacent end plate, A, on a stud, H6, which is fixed on the end plate. The rear end of the plate, H1, is near the forward arm of the lever, G9. On the right hand face of the rear part of said plate is a wrist, H2, which extends through said plate and has a shoulder, H3, bearing against said plate. On said wrist is a roller, H. On the outer end of said wrist next to the plate is a nut, H4. When the plate, H1, is tilted rearward, the roller bears against the forward arm of the lever, G9, and presses said arm downward, whereby the other end of said lever is raised sufficiently to lift the pawl blade, G6, out of engagement with the ratchet wheel, G11. While this condition continues, said pawl is inactive notwithstanding the movements of the arms, F2 and F3, and the link, G2, and the oscillating member, G. The triangular plate, H1, is controlled by an upright rocking lever, H8, located at the left of the end plate, A, and pivoted on the bracket, H9, seated on the base plate, A1. A contracting coiled spring, H10, applied to the upper end of the rocking lever, H8, tends to tilt said lever rearward. In the rocking lever, H8, is an upright slot, H11, which receives a roller, H13, which is supported on a stud, H12, which has a shoulder, H14, and has a shank, H15, bearing against the left hand face of the triangular plate, H1. The shank, H15, rests in a curved slot, H16, formed in the plate, H1, concentric with the stud, H6. On the right hand end of said shank is a nut, H17. By driving said nut forward, it and the shoulder, H14, are firmly pressed against the plate, H1, whereby the shank, H15, and the stud are held immovably in the curved slot, H16. After loosening said nut, these parts may be shifted in said slot to vary the relation between the rocking lever, H8, and the plate, H1, whereby the time of contact between the roller, H, and the cam lever, G9, is varied.

At intervals the rocking lever, H8, is forced forward, against the action of the springs, H10, by means which will now be described.

At the level of the main shaft, C, a U-form yoke, H18, has one of its arms applied flatwise to the left hand upright face of the rocking lever, H8, the open part of the yoke being directed toward the shaft, C. An axle, H19, extends horizontally through the yoke and supports a roller, H20. Said roller is of sufficient length to permit making the part adjacent the lever, H8, cylindrical, and making the other part, H21, tapering or frustroconical. The cylindrical part of this roller is to be engaged by cam plates, I, mounted radially on the ratchet wheel, I1. That wheel loosely surrounds the main transmission shaft, C.

The rim of said ratchet wheel is thick enough to have radial recesses, I2, in the left hand face and to have at the right of those recesses ratchet teeth, I4, to serve as described further on. The recesses, I2, are of uniform size and shape so that any cam plate, I, will fit any one of the recesses. Each cam plate is apertured to receive a cap screw, I3, extending through said plate and threaded into the body of the wheel, I1, whereby the cam plate is firmly secured in the recess.

Let it be remembered that the wheel, I1, is loose on the shaft, C. It has a hub, I5, extended leftward. On that hub is a circumferential channel, I6, which receives wrists or studs, I7, on a shift lever, I8, which is pivoted by means of a stud, I10, rising from the horizontal bracket, I9, fitted around the stay rod, I11, and secured to said rod by means of a set screw, I12. The wheel, I1, is to turn clockwise, as viewed from the left of the machine. Each cam plate, I, has a cam face, I13, formed to engage the roller, H20, and press it progressively forward and away from the wheel, I1. In said face is a depression, I14, adapted to momentarily receive the roller, H20, during the downward passing of the cam plate. Pressing the roller, H20, forward causes forward tilting of the lever, H8, for tilting the triangular plate, H1, to raise the roller, H, away from the cam lever, G9, to permit downward movement of the pawl, G4, to engage the ratchet wheel, G11.

The ratchet wheel, I1, is turned by a relatively large upper pawl, J, and a similar lower pawl, J1, the latter having at its free end a hook while the former has at its free end a point adapted to engage the ratchet teeth, I4, of the wheel, I1. Said pawls extend rearward from the wheel, I1, and between the arms, J3, rising from a hub, J4. A pintle,

J2, extends through said arms and through said pawls. A contracting spring, S, has its ends connected to the two pawls and yieldingly draws the pawls to the ratchet wheel. The hub, J4, surrounds and is immovably secured to a rock shaft, J5, which rests in bearings, J6 and J7, formed on the upper part of the bracket, C8, which is seated on the base plate, A1, and supports the gear wheels, C2 and C3. The bearing, J7, is approximately in the plane of the main spur gear wheel, C1. At the right of the bearing, J7, a short upright rocking arm, J8, is fixed on the rock shaft, J5. The rear end of a horizontal pitman, J9, is coupled to the arm, J8, by means of a wrist, J10, fixed on said arm. The forward end of said pitman receives a horizontal crank wrist, J11, on a slide plate, J12, seated in a channel, J13, in the disc, J15, secured to the right hand face of the main spur gear wheel, C1, by means of cap screws, J14, extending through slots, J16, concentric to the axis of said disc and the spur gear wheel, C1. The slide plate, J12, has a longitudinal slot, J16. A cap screw, J17, extends through said slots for binding said plate to said disc. When said screw is loosened, the plate, J12, may be shifted endwise for shifting the crank wrist, J11, toward or from the axial line of the wheel, C1, and the main shaft, C, to vary the length of the throw of the pitman, J9. The time of the throw of the pitman may be varied by turning the disc, J15, on the wheel, C1, after loosening the screws, J14.

It will now be seen that the constant rotation of the main spur gear wheel, C1, will cause the reciprocation of the pitman, J9, whereby the rock shaft, J5, and the arms, J3, are rocked and the pawls, J and J1, are reciprocated, the pawl, J, acting on the ratchet wheel, I1, during forward movement and the pawl, J1, acting on said ratchet wheel during rearward movement. The free ends of said pawls are made wide enough to remain in engagement with the ratchet teeth of the wheel, I1, during sidewise movement of that wheel by means of the shift lever, I8, already described. This same result may be accomplished by making the ratchet teeth, I4, wide enough to remain in engagement with the pawls during the sidewise shifting of the ratchet wheel.

When this ratchet wheel has been shifted so as to bring the cam blocks or plates, I, into the plane of the cylindrical part of the roller, H20, the rotation of the cam wheel will cause the cam plates to press said roller and the yoke, H18, and the lever, H8, outward (forward). But when the cam wheel is shifted on the shaft, C, so as to bring the cam plates into the plane of the slanting part, H21, of the roller, H20, the cam plates can pass the roller without making engagement with said roller. Under that condition, the cam wheel can turn indefinitely without tilting the lever, H8, to free the cam lever, G9, from the roller, H.

In the drawings, Fig. 8 shows only one cam plate. That provides for one movement of the rocking lever, H8, during one rotation of the wheel, I1. Fig. 12 shows two cam plates diametrically opposite each other. That provides for two movements of the rocking lever during one turn of the wheel, I1, the intervals between said movements being equal. Any number of the cam plates may be thus placed on the wheel, I1, with any desired spaces between them. Thus the occurence of the non-folded parts of the sheet may be varied.

As a substitute for rendering the wheel, I1, inactive by tapering the roller, H20, the ratchet teeth, I4, on the wheel, I1, may be made only wide enough to come into engagement with the pawls, J and J1, when the wheel is in working position, the adjacent face of the wheel being smooth to allow the sliding of the pawls during their movements. See Fig. 16.

Since, as above described, the transmission to the pawls, E4 and G4, is from the main shaft, C, it is to be understood that the pawls move in unison, the pawl, E4, engaging its ratchet wheel at every stroke and the pawl, G4, engaging its ratchet wheel only when said pawl is not lifted by the depression of the arm, G9. It is also to be understood that the link, G2, is to be adjusted on the rocking arm, F3, to give the oscillating member, G, the longer stroke that is imparted to the oscillating member, E, whereby the pawl, G4, is given a longer stroke than is given to the pawl, E4. Since the two pawls move in unison or simultaneously and the pawl, G4, moves, it follows that the pawl, G4, also moves faster than the pawl, E4, moves.

I claim as my invention,

1. In a machine of the kind described, the combination with a feed roll, of a first mechanism at one end of said roll for repeatedly turning said roll and a second mechanism at the other end of said roll for at times turning said roll farther than the roll is turned by the first mechanism.

2. In a machine of the kind described, the combination with a feed roll, of a first mechanism at one end of said roll for repeatedly turning said roll and a second mechanism at the other end of said roll for at times simultaneously with the action of the first mechanism turning said roll farther than the roll is turned by the first mechanism.

3. In a machine of the kind described, the combination with a feed roll, of a first mechanism at one end of said roll for repeatedly turning said roll and a second mechanism at the other end of said roll for at times turning said roll farther than the roll is turned by the first mechanism, the second mechanism including adjustable means for varying the

frequency of the action of said mechanism.

4. In a machine of the kind described, the combination with a feed roll, of a first mechanism for repeatedly partially turning said roll and a second mechanism for at times turning said roll farther than the roll is turned by the first mechanism, said second mechanism including means for varying the distance through which the roll is turned by said mechanism and for varying the frequency of the action of said second mechanism.

5. In a machine of the kind described, the combination with a feed roll, of a first mechanism for periodically partially turning said roll, and a second mechanism for at times turning the roll farther than the roll is turned by the first mechanism, the second mechanism including a ratchet wheel, a rocking member, a pawl hinged on the rocking member, a lever supported on the rocking member and adapted to move the pawl out of the range of the ratchet teeth, and mechanism for periodically tilting said lever, whereby the pawl is made to act on the ratchet wheel through some of the movements of the rocking member and does not so act during other movements of the rocking member.

6. In a machine of the kind described, the combination with a feed roll, of a first mechanism for periodically partially turning said roll, and a second mechanism for at times turning the roll farther than the roll is turned by the first mechanism, the second mechanism including a ratchet wheel, a rocking member, a pawl hinged on the rocking member, a lever supported on the rocking member and adapted to move the pawl out of the range of the ratchet teeth, and mechanism for periodically tilting said lever, whereby the pawl is made to act on the ratchet wheel through some of the movements of the rocking member and does not so act during other movements of the rocking member, and a drive shaft in operative relation with said first mechanism and said second mechanism for driving said mechanisms.

7. In a machine of the kind described, the combination with a feed roll, of automatic mechanism for partially turning said roll, said mechanism including a ratchet wheel and a pawl and automatic means for at regular intervals moving said pawl forward and means including a cam wheel and transmission members between said cam wheel and the pawl for during chosen intervals holding the pawl away from the ratchet wheel and said cam wheel being shiftable into and out of action.

8. In a machine of the kind described, the combination with a feed roll, of a mechanism for partially turning said roll, said mechanism including a ratchet wheel and a pawl and means for at regular intervals moving said pawl forward and means including a cam wheel adapted to bear a plurality of detachable cam members and transmission members between said cam wheel and the pawl for during chosen intervals holding the pawl away from the ratchet wheel and said cam wheel being shiftable into and out of action.

9. In a machine of the kind described, the combination with a feed roll, of a ratchet wheel, an oscillating member, means for oscillating said oscillating member, a pawl coupled to said oscillating member in position to normally engage the teeth of said ratchet wheel, means yieldingly pressing the pawl toward said wheel, a member movably supported on said oscillating member in position to be moved to engage and move said pawl away from said wheel, and means for at chosen intervals moving said movably supported member to move said pawl away from said wheel.

10. In a machine of the kind described, the combination with a feed roll, of a ratchet wheel, an oscillating member, means for oscillating said oscillating member, a pawl coupled to said oscillating member in position to normally engage the teeth of said ratchet wheel, means yieldingly pressing the pawl toward said wheel, a member movably supported on said oscillating member in position to be moved to engage and move said pawl away from said wheel, means for adjusting engagement between the pawl and said movably supported member, and means for at chosen intervals moving said movably supported member to move said pawl away from said wheel.

11. In a machine of the kind described, the combination with a feed roll, of a ratchet wheel, an oscillating member, means for oscillating said oscillating member, a pawl coupled to said oscillating member in position to normally engage the teeth of said ratchet wheel, means yieldingly pressing the pawl toward said wheel, a cam lever supported on said oscillating member in position to be moved to engage and move said pawl away from said wheel, and means for at chosen intervals moving said cam lever to move said pawl away from said wheel.

12. In a machine of the kind described, the combination with a feed roll, of a ratchet wheel, an oscillating member, means for oscillating said oscillating member, a pawl coupled to said oscillating member in position to normally engage the teeth of said ratchet wheel, means yieldingly pressing the pawl toward said wheel, a cam lever supported on said oscillating member in position to be moved to engage and move said pawl away from said wheel, means for adjusting engagement between the pawl and said cam lever, and means for at chosen intervals moving

said cam lever to move said pawl away from said wheel.

In testimony whereof I have signed my name, this 4th day of February, in the year one thousand nine hundred and twenty-seven.

FRANK MAXANT.